

# **3rd Annual CGSR Workshop On Space Policy**

**Space Strategy and Strategic Competition**

**December 10-11, 2019**

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**Center for Global Security Research**  
LAWRENCE LIVERMORE NATIONAL LABORATORY

## Workshop Summary

### Space Strategy and Strategic Competition 3<sup>rd</sup> Annual CGSR Workshop on Space Policy

Center for Global Security Research  
Livermore, California, December 10-11, 2019

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#### Background:

On December 10-11, the Center for Global Security Research (CGSR) at Lawrence Livermore National Laboratory (LLNL) hosted a workshop focused on how space strategy should be integrated into the broader competitive landscape. The workshop aimed to examine emerging problems in space and evaluate effective responses that could support deterrence and assurance. This was the Center's third annual workshop on strategic competition in space, and it built on the success of prior workshops focused on multidomain strategic competition. This session brought together participants from across the policy, military, technical, and academic communities.

The following questions guided the discussion:

1. In the further development of U.S. space policy and posture, what is required to “foster a more competitive mindset” (to cite the 2016 National Defense Strategy)?
2. Setting aside organizational questions, what is required to out-think, out-maneuver, out-partner, and out-innovate adversaries capable of military operations in and through outer space?
3. Can we meaningfully “expand the competitive space” in outer space?

#### Key Insights:

1. While the U.S. has made progress in linking space strategy to wider strategic competition, strategic thinking has not evolved at the same rate as U.S. adversaries' understanding of competition and strategic advantages afforded by space.
2. China and Russia have developed and implemented new strategies for space that include force reorganizations and doctrinal guidance that supports a warfighting posture in, from, and through space. These doctrines also consider preemptive military action in space. Further, the U.S. space community has not sufficiently considered the risks of China or Russia using salami slicing tactics in space to harass the U.S. and its allies in peacetime.
3. Many workshop attendees perceived the U.S. strategic community is self-deterred from fighting in and through space, and generally seeks to avoiding real competition in space to demonstrate restraint. Rather, we need concepts for how to defend or to

attack space to enable terrestrial security operations, and we need concepts for how to coerce adversaries via space.

4. U.S. acquisition processes and contracting practices are too slow for the rapidly evolving space domain. Improving the responsiveness of the commercial sector to the defense community through agile engineering and enterprise architecture principles is necessary and will require the strategic community to develop guiding principles to drive this process.
5. U.S. allies make important contributions in space, providing capabilities and fresh strategic perspectives. However, some allies do not perceive the U.S. to be a reliable partner in space. Our most space-capable allies—France and Japan—are hesitant to exchange strategic autonomy for partnerships or access to space systems, and others are anxious that the U.S. may drag allies into conflicts stemming from hostilities in space. The U.S. could better support strategic partnerships and collaboration with allies by issuing clear messages about collaborative opportunities and intent in space.
6. International norms and legal frameworks governing space have considerable limitations, many stemming from the evolution of competition in the space domain over the last half century. The lack of effective monitoring and verification instruments loom large over both existing and proposed treaty arrangements. Some observers question the continued relevance of the Outer Space Treaty and associated legal texts, but others remain concerned that attempt to revise such documents would be destabilizing.

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## Panel 1: Linking Space Strategy with Defense Strategy

- How does NDS define the requirements of strategic competition?
- What is the current U.S. military approach to strategic competition in space?
- What are we competing for in space? Strategic dominance?
- How does the NDS Commission assess the current DoD approach?

This panel examined the role of space in defense strategy and planning. Recognizing that the United States relies heavily on space-based architectures for warfighting (specifically expeditionary warfighting and precision munitions), the panel outlined a few key aspects that should be included in U.S. space strategies for the near future. The core principles of U.S. space strategy should be to achieve and maintain superiority in system development and deployment, and to be able to deny an adversary use of space in a hostile environment. These precepts should be included in both space-specific strategies and overall defense doctrines, like the National Defense Strategy.

The NDS identifies Russia and China as rising revisionist powers with regional and global goals. Their goals may drive them to take actions that would deny the U.S. access to space or the benefits of space-based systems. Panelists noted that it is critical to frame hostile space activities as a reflection and extension of competition on Earth. Panelists also argued that U.S. defense planners and strategists must work to maintain space superiority—reserving the right to deny an adversary access to space.

Pursuing both space superiority and stability requires effective communication between the U.S. and adversaries. This communication must reinforce U.S. resolve to take action if adversarial behaviors stray outside acceptable bounds, and simultaneously reaffirm U.S. commitments to adhering to existing and emerging norms in space. Communicating with adversaries can be done through various channels and includes signaling. The U.S. should understand that adversarial nations have been observing the ways that different administrations address space. Current and future plans need to ensure that space activities are adequately funded to support coherent strategies.

Current doctrine aims to rectify the strategic imbalance between warfighting assurances and the value of space-based tools. The most recent National Defense Authorization Act presents plans for a Space Force that can deter cross domain conflict and deliver threat-relevant space capabilities. On a broader scale, the NDS explicitly discusses expanding options for competition, promoting potential horizontal escalation models. This brand of competition must be supported by tactics, techniques, and procedures adequate for achieving strategic ends. This fits within the Department of Defense's goal of deterring conflict and prevailing if deterrence fails. Currently, the key challenge is to reduce the costs of standing up a new military space service and ensure a proper cultural shift, good leadership, and strategy for investing in space. However, it is unclear that the current NDS succeeds in offering a coherent logic on how to achieve these goals.

Participants also argued that the NDS does not clearly articulate how to deter and, if needed, defeat an adversary in theater, or how to accomplish the underlying political goals. They further

argued that it is unclear whether deterrence is the optimal, or even an effective, strategy by which to protect space assets.

Overall, panelists stressed that any theory of victory must focus on terrestrial concerns and not lose sight of the political motivations for hostilities in space. Defense strategies and plans should center on engaging with adversaries seeking to realize political goals on Earth. Plans to raise the costs of horizontal escalation into space recognize that adversary plans and doctrine are also not static. China revised its doctrine shortly after the 1996 Taiwan Crisis, emphasizing the necessity of eliminating U.S. space systems as part of its current strategy. Furthermore, U.S. policymakers must address historic patterns of overcommitment and formulate a strategy to tackle multi-theater engagements without relying on readjusting or siphoning resources from other pressing responsibilities.

The panelists stressed the value allies play in the ongoing strategic competition in space. Currently, the U.S. maintains partnerships and alliances with nations that have advanced space capabilities, but cooperation in the space realm remains limited. The U.S. is reticent to leverage alliances to achieve goals in space due to the difficulties of sharing information and concerns about revealing sensitive information or secrets. While the U.S. has adequate information sharing processes with the Five Eyes countries, the most space capable allies are unfortunately outside of this arrangement. This constrains the U.S. in developing fruitful relationships with allies and hampers frank communication between interested parties, as allies struggle to understand what types of contributions and investments would be most meaningful.

Even with strong second mover advantages, most allies do not have large financial resources to pour into space programs and therefore need to be selective about their engagements. The panelists supported a concerted U.S. effort to foster better communication and engagement with allies about strategic opportunities and interacting with the U.S. space industry. This would help move the U.S. and its allies towards a thoughtfully architected concept of how to build capabilities and exercise as a unit. Leveraging outside actors, including allies, is vital in many space activities but is potentially most relevant for space situational awareness. In addition to U.S. allies, industrial partners are vital in the push toward comprehensive situational awareness.

The panelists recommended that the U.S. reassess the methods by which the defense community leverages commercial actors. These industrial partners provide new and sometimes exponentially greater capabilities for fractional costs. Furthermore, commercial space is driving innovation and delivering solutions that the Department of Defense cannot reach for based on regulatory and financial limitations. Commercial space actors have the technology and practices to provide reconstitution and resiliency that directly impacts the mission goals laid out in the NDS and associated space strategy documents. Space operators within government must learn how to leverage commercial systems and data to support U.S. competitive goals in space. Doing so would challenge U.S. adversaries who might aim to degrade U.S. access to global space systems.

## Panel 2: Understanding How Adversaries Approach Strategic Competition in Space

- How do Russia and China approach military competition with the U.S. in outer space?
- How much progress have they made in developing strategy, operational concepts, and capabilities that integrate space with regional war plans?
- Looking ahead a decade or so, are there other competitors of note?

This panel focused on the United States' most near-term adversaries in space: Russia and China. The panelists outlined space-specific doctrine and strategic thinking that informs Chinese and Russian postures in space.

### *Russia*

Understanding Russian thought on space operations must start with a broader understanding of great power competition. Russian thought leaders recognize great powers as only those states with absolute sovereignty, with all other states falling into a sphere of influence. Russia views the current geopolitical arena as poly-centric (rejecting the concept of multipolarity). Russia's terrestrial worldview extends into the space domain, and they view U.S. space superiority, as opposed to parity, as inherently destabilizing.

The Russian consideration of strategic deterrence includes military and non-military means that might be employed to coerce an adversary from taking specific actions. Russian military planners consider space assets to be legitimate targets if they support warfighting. This includes assets that may not have any weaponized aspects but provide critical information for military operations. Commercially operated space systems are perceived as legitimate targets insofar as disabling or destroying these assets would inflict political pain on adversaries. Russian space capabilities are deeply involved with the aforementioned means of strategic deterrence that are deployed not necessarily to "win" a conflict militarily, but to drive an adversary to seek a political solution. Historic international discussions indicate that Russian war planners may assign immense value to early warning satellites and view interference with these systems as highly escalatory.

Russian testing and posturing in space should not simply be perceived as instances of military planners seeking proofs of concepts for operational capabilities, but instead as a potential invitation to arms control. The Russian consideration of deterrence theory is predicated on the credibility of the next phase of a conflict, which in turn rests on the willingness of the state to take the next step on the escalation ladder. The Russian strategic deterrence model of leveraging non-nuclear strategic power is predicated on a clear understanding of intent between adversaries, which currently does not exist. Furthermore, the deterrence model predicts there will be adequate time to communicate and arrive at a political solution between escalatory steps. This is an unfounded assumption.

Russia does not consider space operations as part of a domain-specific strategy, but rather as part of a broader range of strategic operations that are contrasted with theater operations. Within this frame, space operations sit alongside other strategic operations like precision long range strikes, cyber activities, and counterspace capabilities. Based on Russia's combination of

space with other critical strategic capabilities, its deterrence theory affords flexibility across domains to respond to a threat in space, or alternatively to respond to threats in other domains with space capabilities. Russia considers anti-satellite capabilities as inherently preemptive weapons, along with other active defense measures, and couples these capabilities with explicitly preemptive policies. This provides Russian leaders with the means to achieve the goal of bringing an adversary to a political solution.

Externally, Russia generally tends to push back on alliances and security blocs, a trend that continues in space. Symbiotic alliance relationships that involve compromise or mutual decision-making conflict with Russian perceptions of total sovereignty. Instead, Russia tends to prefer relationships with subordinate states that involve a one-way flow of directives from Russia to peripheral states.

Panelists also argued that Russian leaders project confidence, but that Russia faces distinct challenges to the viability of its space enterprise and industry, and that Russia privately is concerned about its future competitiveness.

### **China**

Panelists argued that the People's Liberation Army (PLA) considers space to be one of the four critical warfighting domains, alongside cyber, nuclear, and maritime. Currently, China is not overly concerned with the threat of a mainland invasion but is concerned about U.S. regional presence. China sees space as the key factor that could enable these forces to erode Chinese influence in what they perceive as their sphere of influence. Rapid investments and a military reorganization emphasize the overall emphasis China places on space operations. This stems in part from the widespread Chinese opinion that successful terrestrial campaigns are dependent on the effective application of space; therefore, China is attempting to shape potential conflict and position itself to prevail. This perception is informed by observations of U.S. military reliance on, and integration of, space capabilities for ISR and communications.

Panelists also noted that China's space program has distinct political and economic components. China is using its space program as a centerpiece in an ongoing ideological competition. Party leadership continues to emphasize using space technology and innovation as a tool to impress the world and elevate socialism by proving that the Chinese Communist Party can deliver on its promises. China is integrating space into its soft power agenda, promoting space-based public goods along with the One Belt One Road initiative. This could be likened to the lessons learned from the construction of the Great Wall, a project that delivered a resolute message to the immediate adversary, but also to potential adversaries and to an internal Chinese audience. Delivering on these promises in space, however, is no longer solely a top-down effort. The Chinese space industry utilizes an effective lobbying operation to influence overall Chinese space policy.

Space has been a vital part of the PLA shift away from Maoist principles of People's War to informatized local war, supported by advanced technology. This manifests in a theory that modern war will be network-centric and emphasizes strikes against an adversary's C4ISR systems. According to panelists, this includes targeting civil, or otherwise non-defense or non-governmental, assets like commercial space systems that perform missions for the defense

community. Panelists also argued that China considers early warning systems to be legitimate targets, and there are few assessments available in the existing literature regarding what types of space systems would be off limits for preemptive attack. This strategy poses many challenges to U.S. defense planners.

China has also reformed and reorganized its military structure to better address space through the Strategic Support Force. This move shifted what was a more traditional research and development group and assigned it a warfighting directive. This reorganization places space in the same cadre as cyber and electronic warfare. However, Chinese military space capabilities are still not completely consolidated. Regardless, panelists argued that the PLA understands the importance of, and is prepared to fight for, control of space and space-based warfighting assets. However, panelists argued that PLA does not consistently challenge its assumptions, which could prove problematic for future decisionmaking.

Internally, China is pleased with its rate of progress and its accomplishments to date. Assessments rate Chinese military reforms as successful and ahead of schedule. Government planners are already assessing 2035 objectives and looking to private sector entities for organizational and operational inspirations. However, panelists argued that China still believes it has a long way to go.

Finally, panelists argued that while both China and Russia have actively promoted specific arms control documents, they have been unwilling to include provisions for effective verification regimes. Other disagreements, on topics such as what types of weapons should be included under a prospective ban or other arms limiting agreement and how to preserve a state's right to self defense under Article 51 of the U.N. Charter, have complicated arms control efforts in forums like the Conference on Disarmament. Both China and the Russian Federation delegations also reject arms control efforts from organizations outside the United Nations network.

### **Panel 3: Understanding Evolution of the U.S. Approach**

- How has thinking developed over the last decade or so about the place of competition in U.S. military space strategy?
- How competitive is the U.S. military space enterprise in its current state?
- What improvements to the U.S. position would most worry Russia and China?
  - What factors explain the unwillingness or inability of the U.S. to compete more effectively?

This panel examined the historic development of U.S. space policy, focusing mainly on the last decade of geopolitical competition and security challenges. The panel began with an overview of space policy documents and postures, noting the guiding tenets and challenges of the seminal documents. The panel noted that U.S. policy has been evolving for over a decade, discussing, for instance, the U.S.'s 2010 National Space Policy and 2011 National Security Space Strategy and the motivations behind them.



The panel then highlighted four pillars of the current U.S. strategy: developing resilient space systems, strengthening deterrence, augmenting situational awareness, and reducing regulatory burdens on innovators. They argued that these activities all support U.S. superiority across the spectrum of space activities, but that the U.S. currently faces an array of challenges.

The panel argued that extensive acquisition reforms could help overcome some of the challenges of meeting these goals, and hurdles of the past. Specifically, they argued that a new acquisition structure should allow for greater production agility with open architectures to enable rapid integration of innovative new technologies into architectures. While this would be a large departure from the more rigid approaches currently used in defense contracting, it would allow the U.S. defense community to rapidly optimize to meet new needs and counter new threats from adversaries.

Panelists argued that a focus on more agile architectures, resilience, and defenses (including cyber defenses) would similarly enhance U.S. security and help deter adversaries. They argued that the current U.S. reluctance to discuss space and cyber capabilities degrades the potency of deterrence, and that the U.S. should consider whether and when potential future capabilities should be revealed for signaling purposes.

#### **Panel 4: Outthinking Red on the Military Space Mission**

- In creating the needed new intellectual capital (strategy, policy, conops), how far are we from the starting and finish lines?
- What are the sources of innovation in U.S. military space strategy? Who outside the space community is engaged in thinking about space war?
- Where should new capacity be added? Can it be added?

This panel outlined successes and shortcomings in U.S. space policy, specifically issues in military posturing vis-a-vis China and Russia. Broadly speaking, the panel criticized overreliance on deterrence as a passive threat and one that runs the risk of catastrophic failure. Panelists also argued that there is insufficient understanding in government and military circles about what space power looks like, and about how to conceptualize space superiority in the context of military strategy. Whereas land, sea, and air power can be measured by troops or materiel, there is no widely agreed upon metric with respect to space.

Panelists also noted that there is a lack of clear doctrinal guidance for space operations, and that this will present significant challenges with respect to managing potential future conflict in space. They pointed to the historical record, where every few years there has been a major restructuring of U.S. military space organizations that fundamentally alters the landscape, and argued that the U.S. military is suffering from a case of change fatigue. They also expressed worry that ongoing organizational changes may not settle this issue because future changes in the political landscape could lead to additional changes.

Panelists cautioned that creating a separate institutional structure to solve current limitations with respect to space strategy and doctrine is appealing, but that this approach also has potential limitations and risks. They cited the United Kingdom's experience in establishing the

Royal Air Force as a separate organizational structure as an example here, noting that as the first separate air force, the RAF seemingly should have had a head start on all other air forces around the world, but that in reality, stripping the Royal Navy of its aviation capability hampered the development of airpower doctrine in the British military. They cautioned that the U.S. should use such examples as a guide for ensuring that adequate resources and attention are devoted to the problem, in order to avoid similar problems.

Panelists then turned to a discussion of the nature of the future military space mission. Panelists noted that every military service has as its purpose the mission to control, or contest the control of, a domain. They argued that U.S. warfighting strategy does not currently include a comprehensive elaboration of how the new U.S. Space Force and U.S. Space Command will control the space domain. However, they also noted a positive trend—the U.S. defense community has decisively moved toward a recognition that space is a warfighting domain, that it is vital to military operations, and it is currently working to ensure space capabilities are available for the warfighter.

Finally, panelists spoke about institutional approaches to guide future investments. They noted the potential role of the newly-created Space Development Agency in guiding what types of investments the government should make—and what types of investments should be left to the private sector. They noted the potential for lessening the burden on military investments, and bolstering critical capabilities, by partnering with the private sector. However, they also noted that despite a burgeoning commercial sector, there will be limitations to private sector contributions. Some capabilities—including nuclear command and control, and communications—will need to remain a government function.

### **Panel 5: Out-Innovating in Building the Next Space Force**

- What problem are we trying to solve—or should we be trying to solve?
- Will simply innovating at a faster pace solve the problem?
  - How should we balance offense with resilience, reconstitution, and defensive operations?

Panelists argued that the overall state of U.S. strategic thinking in space leaves significant room for improvement. A primary concern is that the strategic landscape is rapidly changing but that the U.S. is consumed by shorter-term considerations. They argued that there needs to be a greater focus on long-term strategic planning in order to out-innovate in building the new Space Force.

From an architectural perspective, panelists argued that more attention should be paid to long-standing approaches to space architectures which could be destabilizing in a crisis, like co-mingling strategic nuclear and conventional missions on the same satellites. They argued that this architectural approach may create incentives for adversaries to strike these satellites early in a conflict, which could hamstring U.S. responses. Although an adversary may only intend to inhibit U.S. tactical operations, such strikes could ultimately undermine strategic nuclear capability, leading to potentially dangerous escalation.

Panelists also noted that the U.S. should focus on solving conceptual problems, including how, when, and whether to rely on strategies like deterrence in space. For instance, they noted that a pure deterrence by denial strategy likely is not aggressive enough to prevent strikes on space systems because it would not threaten costs for such actions, and that a comprehensive deterrence strategy probably would also need to incorporate credible threats of punishment. However, they noted that there is and should be a role for denial approaches that emphasize the futility of hostile actions in space through mission assurance and improving the resilience of space systems and architectures. As part of this effort, they argue that the U.S. could choose to declassify capabilities at times of need to signal and communicate this resilience. They also argued that improvements in space situational awareness would prevent adversaries from hiding in the fog of war in space.

Panelists cited the need to foster and build a new cadre of space-minded thinkers who have advanced comprehension of space and science. They argued that this new cadre will be necessary for bridging the gap between space means and U.S. objectives. These individuals need not be sourced from one pool of degree holders; in fact, diversity should be championed in this cadre. This is especially important as space is no longer solely a defense or national security mission, but should include voices from the commercial space sector, insurance markets, and other areas of government, like the Department of Commerce.

Finally, panelists noted the pivotal role that U.S. allies will play in out-innovating in space. They also noted, however, that much as U.S. space strategy remains underdeveloped, there also is a lack of development of space-focused strategy on the part of U.S. allies. Thus, U.S. policymakers should encourage allied countries to develop their own space strategy cadres, and foster diversity of thought amongst alliance partners, which in turn will improve the content and quality of alliance strategic planning.

## **Panel 6: Out-Partnering with Allies**

- What role does space cooperation play in current alliance structures?
- Which aspects of cooperation are productive and which lag? Why?
- What concrete steps should be taken to improve cooperation with allies?

## **NATO**

Panelists noted that NATO defense ministers agreed in June on the terms of an overarching space policy. NATO members followed up on this action by identifying space as a separate operational domain. Overall, the goal of the new NATO policy is to promote collective security. NATO issued the new policy to contribute to alliance defense and resilience not just in space, but for overall European security and stability. Declaring space as an operational domain will assist NATO in integrating space into strategic planning, collective action, and to build channels to complement non-NATO allies and other international organizations in space.

NATO plans to pursue these objectives without developing NATO-owned and operated space systems, but rather the member states will own and operate their own space systems. Nearly

half of NATO members are space actors, even though only a handful are considered traditional space powers. NATO plans to leverage voluntary contributions from allied space operators to aggregate data, services, and capabilities to aid alliance members in developing resilient space architectures. Instead of developing advanced space systems, NATO aims to facilitate interoperability and compatibility between allies in space. This includes aligning standards, techniques, tactics, and procedures and strategic thinking among allies. NATO seeks to support multinational collaboration and sharing at political, operational, and technical levels.

NATO, as an organization, recognizes the immense value of space as an enabler of deterrence and defense and aims to ensure that all alliance members share this baseline understanding. However, NATO has not issued prescriptive guidance on how to apply collective defense protections to attacks against space assets, and it needs to develop procedures for attribution and circumstances in which Article 5 could be invoked. As a next step, NATO will explore and address topics like what constitutes an armed attack and the standard process for attribution in the future to avoid relying on only one alliance member's data. This will likely be a challenge for NATO only some allies have advanced space situational awareness (SSA) capabilities necessary for collecting and sharing this data.

The next strategic step for NATO is to produce a roadmap and implementation plan, which is expected in mid-2020. This plan will emphasize the role space plays in enabling other functional domains and strategic capabilities such as missile defense. At the alliance level, NATO will have to expand its cadre of space experts. Currently, NATO has very few staff assigned to an immense (and expanding) space portfolio. Finding individuals to take on this workload will be challenging based on the complexity of the work and also the availability of candidates who can be seconded or hired from member states. Furthermore, NATO may not be able to generate political momentum across the alliance even with an adequate headquarters workforce, because some member states do not have sufficient personnel or resources to address such issues. Establishing political unity will be vital as NATO moves toward defining and building a future space policy.

### **United Kingdom**

The United Kingdom has an extremely complex and uncertain roadmap for the future of British space power. On the one hand, the U.K. has developed advanced space systems and makes significant contributions to situational awareness missions. It is increasingly considering the role of space as part of the strategic planning process, and organizational changes suggest a slow maturation of space policy. However, current political issues associated with Brexit and economic constraints are forcing the U.K. government to reconsider the role space plays in both civil and defense planning.

For instance, core documents like the Defence Space Strategy are overdue and leaves gaps in the overall strategic posture. Low budgets have also neglected non-military missions in space. There are also not enough space specialists at the higher levels of government to effectively guide and implement space policy. At a more tactical level, the British space community is limited in its operational capacity by underdeveloped cadres of analysts who can receive, transform, and apply data from space systems into actionable solutions. These constraints limit UK's ability to contribute and integrate with allies and partners.

Further, planning and forecasting relationships between the U.K. and other space actors is nearly impossible with mounting political pressures and uncertainty about the future of the U.K. in the European network. Like all U.K. politics, Brexit impacts space planning and strategy development. The U.K. will eventually leave all EU-funded programs, to include the European Space Agency (ESA). While this does not completely shut the U.K. out of working with ESA, any relationship will be predicated on a separate negotiated contract, and privileged access to systems like Galileo will disappear. The U.K. already experiences budget constraints, and replicating the European collective space programs will be immensely expensive. The significant capital and time needed to replicate such capabilities would reduce the likelihood of groundbreaking innovation.

### **Australia**

Australia is currently managing a transition from being dependent on U.S. space systems to developing indigenous space capabilities that offer burden sharing opportunities to partners in space. Various ongoing projects provide secure, resilient, and sovereign capabilities, including space-based surveillance and communication networks. Australian strategic aims include providing resilient space architectures to allied defense forces through disaggregation, augmentation, and reconstitution. Overall, Australia leverages second mover advantages to accelerate its ability to provide substantial strategic impacts in space.

Australian plans for advanced space systems include a mix of advanced and basic technologies. This includes, for instance, exploring the use of cubesats to meet C4ISR needs. These advances will also enable satellites themselves to complete value-added activities that are currently performed by actors in the ground segments of a space system. This will increase burden-sharing potential by eliminating restrictions imposed by sovereign borders and data ownership issues.

While Australia has established plans for the future of space systems and international collaboration, distinct challenges remain. Australia still has not published an unclassified defensive strategy, although it is likely forthcoming. Current published doctrine addresses civil space and supports economic goals by supporting national capabilities and international collaboration. Australia would be best served by issuing a public, declaratory space strategy that outlines its role in supporting space security and stability.

Currently, Australian space professionals constitute a small community. These thinkers and technical staff have had an outsized impact on the evolution of international space policy. However, if Australia clearly defines space as a domain that is more than an extension of air or naval power and seeks to implement this new paradigm, it will likely require expanding the Australian government's workforce dedicated to space issues. Australia recognizes that arms control and threat reduction activities for space are difficult and potentially not a viable prospect, and that current space law is inadequate for supporting stability and security.

### **Japan**

Space is a relatively new security domain for Japan, and presents a ripe opportunity for partnering. Although space is not a large component of the Japan-U.S. relationship, Japan does have significant capabilities that would interest the U.S. and support overall space superiority. Renewed interaction, joint partnerships, and investments in the space domain would signal a

revival of the alliance, emphasize the importance of space security for East Asian allies, and focus adversarial attention.

Japan has developed similar space-based capabilities as China, but on smaller budgets. The current suite of capabilities are constrained to ISR and defensive activities and are consistent with the current Liberal Democratic Party leadership goals of normalizing the Japanese role within the global security and defense network. Japan has tapped cyber, space, and electromagnetic capabilities as areas that need increased investment and is looking to expand the military portfolio in these areas. Japan is beginning to structure their future force with resiliency as a guiding principle.

Japanese capabilities and systems for future development come from consultations with the U.S. and other allies. Unfortunately, there is some level of frustration brewing in Japan stemming from frustrating communications about these recommendations. Broadly, Japan has fulfilled or outgrown the recommendations they have received, and are now recognizing the stagnation in communications with the U.S.. Japanese space experts outside the MOD also tend to be strong pacifists, hamstringing the ability to foster meaningful conversations with defense strategists.

Japan and the U.S. exchange liaison officers in space, but additional engagement and education would aid the development of shared techniques, tactics, and procedures. Sharing these baseline characteristics would enable joint exercises in space between the U.S. and Japan. Improved collaboration and joint programming would help the U.S. and Japan address shared security concerns in East Asia. This is evident in the cooperative history between the two countries. Projects like the Standard Missile 3 Block II-A illustrate the impact of cooperative efforts between the U.S. and Japan. It is important for the U.S. to improve active communication with Japan to help direct symbiotic space investments.

### **France**

France announced a new Defence Space Strategy in 2019, stressing the importance of “strategic autonomy.” This principle is intended to guide France in tactical and strategic partnerships with the U.S. and European powers. To cultivate “strategic autonomy” in space, France is establishing a Space Command under the Air Force, replacing the Joint Space Command, and rebranding the Air Force as the Air and Space Force. France is pursuing new defense technologies under this guiding concept, including active and passive defense measures such as laser systems and micro satellite defense escorts. These defense measures address both ground-based and on-orbit threats from hostile nations.

Primarily, France applies the concept of “strategic autonomy” to ensure freedom of action and decision making in space. The strategy emphasizes defense systems to adequately prepare French space systems for hostile interference, with a distinct focus on preserving the space-based infrastructure that enables a credible nuclear deterrent. Notably, this new strategy also emphasizes partnerships with allies and the private sector. France has an established commercial aerospace sector and is committed to providing this industrial base with regulatory and financial support to develop innovative space systems and launch capabilities. France is also committed to developing a space situational awareness project to establish an indigenous capability to attribute and respond to activities in space—an effort on which it is partnering with

Germany, highlighting the potential for future strategic partnerships with European space actors.

Nonetheless, the concept of “strategic autonomy” as promoted in the Defence Space Strategy imposes limits on the nature and depth of French partnerships with international partners. For instance, while current policy suggests France has an interest in a strong and independent European space sector, and commits France as a valued partner in the journey toward that goal, France has indicated that “strategic autonomy” also means the ability to retain control over vital space systems in the event of a crisis. These two desires create an internal tension in current French space doctrine and policy.

### **Panel 7: Out-Partnering with the Private Sector**

- What are the lessons of past experience? What works and what doesn't?
- Can these partnerships be remade in a transformative way?

Panelists started by highlighting the innovation and potential partnerships offered by the private sector, specifically how the private sector could support major space powers and what types of regulatory shifts would best support industry in turn. The panel noted that a lack of clarity with respect to long-term U.S. needs and goals, and the regulatory environment, has limited engagement with the private sector.

Panelists noted that the historical record shows the value of private industry in developing and projecting global power. Looking at non-space examples like the spice trade and railroad era illustrate the importance of private investors in developing the means and rationale to travel long distances. Commercial aviation and air mail developed the cadre of pilots that led to U.S. air power superiority in World War II. These were all successful projects that allowed the great powers to project power over vast distances, and all relied on effective logistics. In the space arena, the Apollo program serves as a case study for successful government interaction with the private sector. The panel emphasized that the program was not just a technical achievement; the Apollo program gave rise to both a labor force of engineers and inspired bold thinking.

The panel recommended convening a group of industry leaders, academic experts, and government policy makers to effectively tie schools of strategic thinking and technical expertise together. This group should be set up to support the primary U.S. goal of fostering a robust and innovative private workforce that can support space missions and security. The U.S. has already suffered from limiting private industry in space. For example, the defense community has to source synthetic aperture radar services from allies because of regulations that suffocated indigenous industry. Reconsidering the effects of these restrictions might guide U.S. policy makers to devise better regulatory regimes and foster rapid innovation.

The private sector is well positioned to provide needed upgrades on heritage and legacy hardware that support space missions. The current practice of requirements-based acquisitions does not allow agile design and development. Companies and innovators have entered markets to deliver services and capabilities that were once solely provided by the government.



Adversaries still have opportunities to disrupt the U.S. space industrial base even without poaching firms or luring talent away from innovative hubs. Within the next few years, China will have parity with the U.S. in low latency earth imaging, offering high resolution global imagery at rapid cadences. There is a risk that this data could be disseminated for free or in another way that erodes the economic viability of U.S. commercial satellite imaging businesses. China, not bound by the same economic considerations as the U.S. and private companies, would potentially also be able develop “global truths” by flooding the market with their own select satellite imagery. This type of soft power could be immensely valuable as China aims to influence the international discussions about territorial disputes.

The space industrial base might be able to provide rapid, real-time products and systems to support urgent needs, but the defense community is not equipped with flexible contract vehicles to source these systems. The U.S. military’s idea of collaborating and innovating with the private sector is not compatible with the paradigm of “everything as a service,” which is currently at the heart of Silicon Valley business strategies. This disconnect needs to be solved by creating new military acquisition paradigms.

The private sector faces security challenges as well as existential economic concerns. Diverse supply chains and off-the-shelf technologies open industrial actors to cyber and other operational threats. These types of considerations put everyone in space at risk. Satellites could suddenly become co-orbital antisatellite capabilities if hacked with the intent to cause damage. This introduces a large amount of uncertainty and risk into business in space.

Beyond the economic and operational considerations, the U.S. has significant regulatory challenges. The U.S. predilection to source from domestic firms has degenerated into a culture that eschews foreign services and systems. U.S. adversaries have studied and understand the space market, and are prepared to exploit these flaws. China is able to take innovative intellectual property and bring it to market with competitive pricing advantages that the U.S. cannot match. Regimes like the International Trafficking in Arms Regulations prevent U.S. firms from commercializing by artificially limiting the market to domestic customers. Adversarial states are unfettered by these regulations and sell to international customers in lieu of U.S. firms.

But the outlook is not completely bleak. The U.S. defense community does have good practices that could become more ubiquitous. For instance, certain organizations in the defense space issue problem statements rather than requirements lists, providing companies with the flexibility to address the whole problem, or only a portion of it. This leads to effective solutions that allow focused companies to provide the best solution for a portion of the project.



## Panel 8: Calibrating our Level of Competitive Ambition

- What can reasonably be accomplished in one year?
- What can reasonably be accomplished in five years?
- What 10-year stretch goals make sense?

The U.S. space community today recognizes the need to treat space as an operational warfighting domain, and it is moving to develop doctrine and organizations to support these ends. However, the U.S. is still going through a learning process to understand the vast technological changes underway, and to adapt to them.

U.S. strategic thinking needs to evolve, as traditional deterrence concepts do not meet the challenges associated with space stability and security. Strategies to impose costs through punishment do not shape the domain in a way that benefits the U.S. warfighter. The U.S. must also build a more holistic understanding of how to apply coercive strategies in space, and these concepts must be consistent with our approach to space defense.

U.S. defensive thinking in space has been overly focused on all-out space warfighting, rather than the risks of our adversaries employing grey zone activities and salami slicing tactics in space. There is currently a dearth of strategy for military space operations below the level of armed conflict, a level in which the U.S. and allies face extreme—and little considered—strategic risks. These grey zone activities are spurred by terrestrial competition that flows into the space domain. As with grey zone activities on Earth, escalatory thresholds for behavior are not well defined.

On a functional level, the U.S. military relies on strategic capabilities in geosynchronous orbit, which creates the potential for uncontrolled escalation if a future conflict extends to that region of space. The defense community needs to find solutions for this problem, and today's popular answer of bringing those exquisite capabilities down into proliferated low Earth orbits is not the solution. Hybrid architectures using dissimilar satellites in multiple different orbit types should be the new standard for strategic military space capabilities, but the additional costs of these extra satellite units are likely to be high.

The U.S. may be able to lean on private sector capabilities or commercially available systems, but integrating these commercial actors has been difficult. The U.S. is developing important capabilities in concert with the private sector, but overall the strategy for space system development needs to be refined. Space situational awareness is of particular concern. Robust situational awareness capabilities require the ability to perform attribution to hold adversaries responsible for malicious actions in space and potentially also to build trust with allies. These capabilities are not in place, and it is unclear that there is a valid pathway to get there from here.

Overall, the space strategy community should place primary emphasis on more clearly articulating what space strategy is and fully integrate it to the national strategy. Over the next ten years, the U.S. also needs to deepen relationships with allies and integrate commercial space into planning and strategy. This is all a part of the domain shaping process. Achieving just these

goals likely will take the U.S. most of the next decade. At the same time, the U.S. should consider setting competitive ambitions higher than this baseline, even if it means taking on more risks of failure. The U.S. should also consider, as part of a grand strategy, what types of constraints on action in and through space are achievable and desirable through formal or informal arms control mechanisms.



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